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Remittances and Investment: The Role of Financial Inclusion

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Abstract

This paper sheds light on the role of financial inclusion to leverage investments from remittances. Employing linear dynamic estimation techniques (system GMM) on a panel of 54 countries over the years 2004-2015, I find evidence for a complementary relationship between financial development and remittances in promoting investments. Measures of the sophistication as well as the accessibility of the financial system suggest that higher financial development across both dimensions encourages investments. Especially an increase in the number of deposit accounts has significant potential to leverage investments. The results control for endogeneity and are robust to different specifications as well as a variation of the sample. The findings encourage policy action towards higher financial inclusion in order to accelerate the developmental impact of remittances.

JEL Classification: F24, F43, O11, O15 and O16

Keywords: remittances; financial inclusion; investment; dynamic panel estimation

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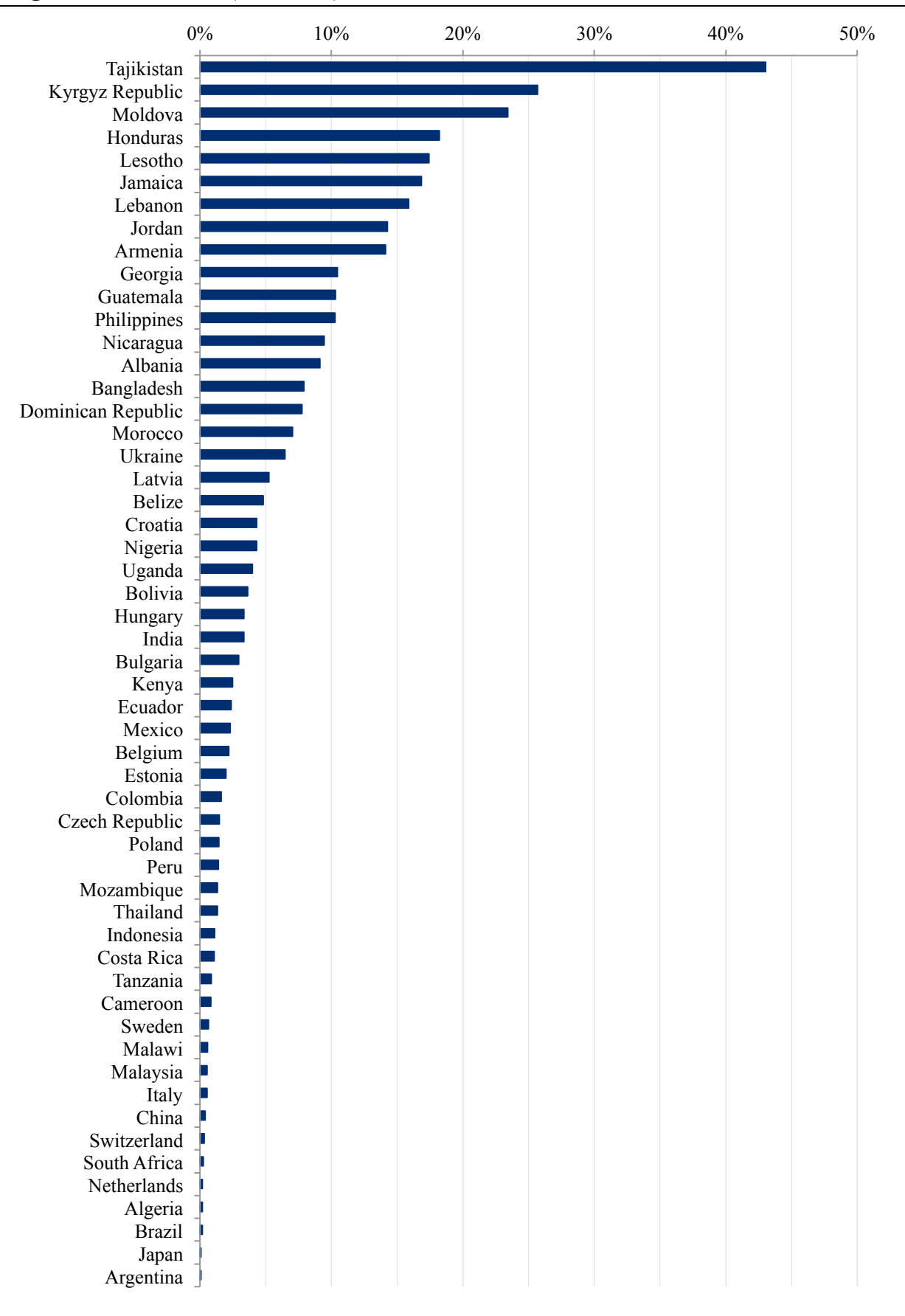
1. Introduction

Remittances have received increased attention by researchers as well as governments and supranational institutions recently. Remittances in cash or in kind sent back by international migrants to their home economy represent the largest source of foreign capital inflows after foreign direct investment. In 2015, globally recorded remittance flows amounted to as much as 553.7 billion US Dollar. In contrast, official development aid accounted for 131.6 billion in the same period.¹ These large and stable capital inflows are understood to have significant potential to foster macroeconomic development in recipient economies as well as significant microeconomic improvement, such as increased household income, reduced poverty and greater access to financial products. While the microeconomic impact of remittances is well documented in existing literature, the relationship between remittances and macroeconomic variables has not yet been conclusively investigated. Many development economists believe that certain country-specific characteristics such as financial development may be decisive to leverage macroeconomic outcomes from remittance inflows.

In this paper, I investigate the role of financial development to leverage investments from remittances. For this purpose, financial development is measured across two dimensions: Financial depth (sophistication) and financial width (accessibility). I employ linear dynamic panel techniques with time-invariant country fixed effects to estimate the impact of remittances on the investment-ratio, conditional on financial development indicators in the recipient country. The estimated parameters following this approach can be interpreted as the elasticity of the investment-ratio with respect to remittances given different levels of financial inclusion. I use annual data from 2004 to 2015 for a panel of 54 countries. Remittance flows to the countries in the panel are illustrated in Figure 1.

¹ A visual comparison of different foreign capital inflows can be found in Figure A.1 in appendix.

Figure 1. Remittances (% to GDP) in 2015



Source: World Bank – World Development Indicators

The remainder of this paper is organized as follows: Section 2 briefly reviews relevant literature on the topic. Section 3 describes different transmission channels of remittances on macroeconomic variables. Section 4 discusses the role of financial inclusion in leveraging investments from remittances. Section 5 presents the econometric specification, the data, and the estimation methodology. Section 6 presents the empirical results of the model. Section 7 concludes.

2. Literature Review

The macroeconomic outcomes of large remittance inflows have been under thorough investigation in recent years. Even though the consensus among economists is that remittances do promote positive macroeconomic outcomes besides obvious microeconomic impacts, empirical research fails to evidence such a relationship. Barajas et al. (2009) investigate various transmission channels and fail to find statistical evidence for positive remittance-induced growth effects. Equally, Rajan and Subramanian (2005) as well as Hassan and Rao (2011) cannot identify such a relationship. These papers conclude that the countercyclical nature of remittances may obscure the remittance-growth correlation. In fact, Chami et al. (2008), IMF (2005) and World Bank (2006) showed that remittances, as a stable source of foreign capital inflow may buffer economic recessions and thus indirectly contribute to higher GDP growth rates. Moreover, remittances may impact on GDP growth indirectly through a positive impact on financial development, as found by Aggarwal, Demirgüç-Kunt and Peria (2006). Also investments in human capital can be a source of long-term growth effects induced by remittances, following the results by Acosta, Fajnzylber and Lopez (2007). Another channel through which remittances may indirectly affect macroeconomic variables is through the exchange rate. Amuedo-Dorantes and Pozo (2004), Bussolo, Lopez and Molina (2007) and Acosta, Lartey and Mandelman (2008) show that

large remittance inflows may lead to exchange rate appreciations, reducing competitiveness in global goods markets and consequently leading to Dutch disease scenarios with adverse economic implications. Lastly, literature acknowledges that remittances may impact GDP indirectly through its effect on the investment ratio. The World Bank (2006), Dzansi, Bjuggren and Shukur (2010), and Giuliano and Ruiz-Arranz (2009) find a positive relation between remittances and investment.

Development economists argue that certain country specifics may be decisive to leverage the impact of remittances (Ratha, 2007; Bhatia, Comstock and Iannone, 2009). One important characteristic is understood to be financial development. Hence, a large body of literature has emerged investigating remittance-induced growth effects, direct as well as indirect, conditional on the financial development of the recipient economy. Giuliano and Ruiz-Arranz (2009) and Sobiech (2015) found that remittances may alleviate capital constraints and thus foster GDP growth, however, the effect diminishes with increasing development of the financial sector. Their findings imply a substitutive relationship between remittances and financial development in promoting economic growth. Abida and Sghaier (2014) discovered that the opposite is true for a panel of North African countries, suggesting a complementary role of the financial sector in promoting macroeconomic outcomes from remittances.

Present research, however, restricts indicators of financial development to measures of sophistication, i.e. the amount of intermediation performed by the banking system. This paper contributes to the existing literature by providing new insights regarding the role of the financial system's accessibility to leverage remittances-induced investments.

3. Remittances in an Endogenous Growth Framework

Large remittance inflows can be expected to have strong effects on macroeconomic variables in recipient countries through a variety of possible transmission channels. This section

explores how remittances may affect long-run economic growth in the framework of the endogenous growth concept proposed by Paul Romer (1986). Endogenous growth models are essentially based on capital input, labor input and total factor productivity. In fact, the model builds on the growth accounting framework proposed by Robert Solow (1956), but assumes that positive externalities and spillover-effects of economic growth endogenously increase total factor productivity. The following paragraphs discuss how remittances interact with the different components within the endogenous growth model.

a. Labor

International remittances may have a strong impact on labor inputs in the receiving country through labor force participation changes. First, recipient households may rationally substitute labor income for remittance-income, especially when remittances are understood to subsidize consumption expenditures (Barajas et al., 2009). Secondly, in a similar context, problems of moral hazard can also lead to a reduction of labor input associated to remittances (Chami, Fullenkamp and Jahjah, 2003). This is the case when receiving households take gain in information advantages towards the remitter and divert resources to leisure. Thirdly, migrants working abroad lower the labor force available in the home country, regardless of the amounts they remit (Yang, 2008). This implies a negative relationship between remittances and labor input in the remittance-receiving economy.

b. Total Factor Productivity

Remittances may affect the recipient economy's performance through gains in efficiency due to positive dynamic production externalities and an enlarged productive sector. Such gains may manifest, for example, in higher human capital and more efficient allocation of capital. Another example for productivity gains is the development of a more profound financial system in terms of intermediated funds (Aggarwal, Demirgüç-Kunt and Peria, 2006). Consequently, higher financial development can contribute to economic growth. On the other

hand, potential exchange rate appreciations due to large capital inflows in small economies raise the prices of exports and can lead to an unbalanced economy and ultimately Dutch disease scenarios (Ratha, 2007). This indicates a negative relation between remittances and economic growth.

c. Investment

The most prominent way in which remittances may promote economic growth is by easing capital constraints in the recipient economy simply through providing more resources (Barajas et al., 2009). This implies that the more resources are available, the higher the investment ratio will be. However, the impact of remittances on investments may not only run through the provision of additional resources. If banks were to link creditworthiness and collateral to remittance inflows, for example, the cost of capital may decrease and drive the investments ratio up. The linkage between remittances and investments appears to be positive, at the first sight. However, research shows that remittances are often sent to households with a high propensity to consume and do therefore not significantly contribute to investment. At the same time, remittances may stimulate higher levels of consumption rather than investment and alter the propensity to save. This would consequently lead to higher individual welfare, but not to higher aggregate economic performance (Barajas et al., 2009).

Summing it up, it is likely that remittances have a positive impact on the investment ratio. However, the magnitude of the impact depends strongly on a range of factors that are likely to vary across countries or even across recipient households.

4. The Role of Financial Inclusion

The extent to which each of the described channels will weight in the equation is determined to large extent by country-specific characteristics. One of these, as it is widely acknowledged in relevant literature, is the development of the financial sector. A strong financial sector with

sound intermediary institutions accomplishes two main tasks: First, financial intermediaries provide a liquid store of money and second, transform such deposits to make them available for investment purposes (Diamond and Dybvig, 1983). In this light, financial inclusion may leverage the macroeconomic outcomes of remittance inflows in three important ways: First, channeling foreign capital through formal financial intermediaries increases the capital stock available for all agents, not only remittance-recipient households. The provision of additional resources may ease binding capital constraints and thus promote investments. Second, remittances that are subject to formal financial intermediation may enable households to signal creditworthiness and availability of collateral to banks. This may alleviate credit constraints and therefore lead to higher investments. Third, formal intermediation of capital raises the efficiency of the allocation of capital (King and Levine, 1993), and thus leverages the impact of remittances in the recipient economy. Moreover, access to the financial sector fosters formal transmission of remittances as transaction costs decline with a more developed financial market (Freund and Spatafora, 2005) and therefore reinforces the aforementioned channels.

Consequently, financial development is expected to promote investments from remittances and trigger subsequent gains in total factor productivity. Nonetheless, some literature on the topic offers an opposing view on the role of financial inclusion to leverage remittance-induced investments: Remittance inflows have less power to drive investments in contexts of high financial development, as capital and credit constraints are less pressing and the efficiency of the allocation of resources is high by default. This implies that financial development and remittances act as substitutes with regards to the macroeconomic impact.

In order to empirically estimate the importance of financial inclusion in this context, I employ three different measures to capture the depth (sophistication) of the financial system, following Giulinao and Ruiz-Arranz (2009): Domestic credit provided by the banking sector

to the private sector, as to measure the amount of financial intermediation performed by the recipient economy's banking sector; Deposits, i.e. the sum of demand, time and saving deposits, as an indicator for the banking system's ability to attract savings; and liquid liabilities, or broad money, as the broadest indicator of financial intermediation.

However, these indicators fail to describe the width (accessibility) of the financial system, in greater detail. Access to the financial system including suitable products to match recipient household's needs and trust in the financial system are vitally important to channel remittances towards the formal financial sector (Barajas et al., 2009; Ratha, 2007). Therefore, this study additionally includes the following three variables: The number of ATMs per area as an indicator of the geographic outreach of the banking system; the number of ATMs per 1000 adults as a measure for the demographic outreach as well as the number of deposit accounts with commercial banks per adult to gauge the uptake-rate of available services.

Disentangling the role of financial inclusion in leveraging investments from remittances across two distinct dimensions allows for a more detailed analysis of the impact and consequently a more appropriate deduction of policy implications.

5. Empirical Analysis

5.1. Economic Model

In order to provide consistent estimates, this paper draws upon a system Generalized Method of Moments (system GMM) following Arellano and Bover (1995) and Blundell and Bond (1998).

$$Inv_{i,t} = \beta_0 + \beta_1 Inv_{i,t-1} + \beta_2 Rem_{i,t} + \beta_3 FI_{i,t} + \beta_4 (FI_{i,t} \cdot Rem_{i,t}) + \beta_5 X'_{i,t} + \mu_i + \varepsilon_{i,t} \quad (1)$$

Equation (1) estimates the impact of financial inclusion on the relationship between remittances and investment. The specification describes an autoregressive model of order one, as it includes the lagged dependent variable as an explanatory variable on the right hand side.

The autoregressive component in the specification captures the persistence of the investment variable in β_1 and is expected to carry a positive sign.

The model includes six different measures of financial inclusion (FI), of which three are meant to measure the depth of the financial system and three the accessibility of the banking sector. Each of the respective FI indicators is interacted with remittances in order to study the leverage-effect of financial inclusion for remittance-induced investments. The FI variables under analysis, as indicated above, are credit to private sector as a percentage of GDP, deposits to GDP and liquid liabilities to GDP to measure financial depth; ATMs per 1000 adults, ATMs per 1000km² and number of deposit accounts per adult estimate the importance of financial width. In order to ensure that the estimated coefficients of the interaction terms are not biased upwards by capturing some of the effects of remittances and financial inclusion, the interacted variables are included separately in the estimation. Building on the theoretical framework explained in section 4, a complementary nature of remittances and financial inclusion in promoting investments would manifest in positive coefficients of the interaction terms. On the contrary, a negative estimated coefficient for the interaction terms would imply a substitutive relationship of the two. To allow for a precise interpretation the interaction terms, I analyze the partial derivative of the investment-model (equation (1)) with respect to remittances:

$$\frac{\partial \text{LogInvestment}}{\partial \text{LogRemGDP}} = \widehat{\beta}_2 + \widehat{\beta}_4 \cdot FI \quad (2)$$

In an economic understanding, equation (2) describes the elasticity of the investment ratio with respect to remittance inflows at any given level of financial inclusion. The elasticity is a linear function of the respective financial inclusion variable, where $\widehat{\beta}_2$ describes the intercept

and $\widehat{\beta}_4$ denotes the slope.² High estimates for $\widehat{\beta}_4$ suggest that changes in the level of financial inclusion play a vital role in leveraging remittances for investment purposes.

The model furthermore includes a vector of control variables $X'_{i,t}$ in order to account for other important contemporaneous determinants of investments:³ GDP per capita growth in real terms is included in order to capture the overall economic climate. It can be expected that economic growth promotes investments. The lending interest rate is another important determinant of investments as it reflects changes in monetary policy or the confidence of the banking sector. High lending rates are likely to impede investments and thus are projected to turn out negative in the estimation. Lastly, a financial crisis dummy that uniformly takes the value one for the years of the global financial-economic crisis during the years 2007-2009 is included. A negative relationship with the investment ratio can be suspected.

5.2. Data

This section describes the data employed in the empirical estimation.⁴ The sample covers 54 countries with comparatively high remittance inflows over the years 2004 - 2015 in annual intervals.

The dependent variable under investigation is the gross domestic investment ratio to GDP expressed in natural logarithms (*LogInvestment*). Originating from the World Bank's World Development Indicators, the investment variable is defined as gross capital formation relative to GDP, i.e. "additions to the fixed assets of the economy plus net changes in the level of inventories".

² Ensuing equation (2), a complementary nature of remittances and financial inclusion must hold the following condition: $-\frac{\beta_2}{\beta_4} < FI$

³ The set of control variables follows Giulinao and Ruiz-Arranz (2009). Including more controls does not meaningfully alter the results.

⁴ For a summary of all variables and the respective sources, please see Table A.1 in appendix. A full list of countries in the panel can be found in Table A.2 in appendix.

The remittances variable included in the World Bank World Development Indicators follows the definition of the IMF's Balance of Payments and International Investment Position Manual (2009). As such, it captures the sum of worker's compensation and personal transfers: Compensation of employees includes the income of border, seasonal and short-term workers employed abroad, as well as of residents that are employed by non-resident entities in the home country, such as embassies, international organizations or non-resident companies. Personal transfers include all current transfers in cash or in kind received by the resident household from non-resident households. As it is evident from the definition above, remittances measured this way overstate formal international remittance flows as compensation of employees aggregates amounts that do not conform to the traditional notion of remittances. Nonetheless, this paper employs the indicator published by the World Bank, as it contains the broadest and most consistent dataset available.⁵ All estimations use the natural logarithm of the remittance-to-GDP ratio (*LogRemGDP*). Furthermore, this paper employs six variables to measure financial inclusion, half of which is meant to describe the width of the financial system, and the other half describing the financial depth. For the first, the number of ATMs per 1000 adults (*ATMAadult*), the number of ATMs per 1000km² (*ATMArea*) and the number of deposit accounts per adult (*DepAccount*) are used. All variables are published in the IMF's Financial Access Survey. To measure the depth of the financial system, credit to the private sector as a percentage of GDP (*CreditGDP*), bank deposits to GDP (*DepGDP*), as well as liquid liabilities to GDP (*M3GDP*) are obtained from the World Bank's World Financial Development database.

Regarding the set of control variables, annual real GDP per capita growth (*GDPGrowth*) was retrieved from the World Development Indicators. The lending interest rate (*Lending*)

⁵ Furthermore, as discussed above, it must be noted that the remittances variable does not cover informal remittances flows.

originates from the IMF International Financial Statistics database. Lastly, the financial crisis dummy uniformly accounts for the global financial-economic crisis 2007-2009 (*FinCrisis*).

Table 1 presents the summary statistics for all variables.

Table 1. Summary Statistics

Variable	N	Mean	Std. Dev.	Min	Max
LogInvestment	750	3.141	0.282	1.699	3.998
LogRemGDP	767	0.775	1.661	-4.097	3.928
ATMArea	734	43.498	69.668	0.006	403.846
ATMAult	734	0.402	0.358	0.000	1.574
DepAccount	632	1.283	1.277	0.001	7.984
CreditGDP	704	51.915	41.974	2.595	194.215
DepGDP	704	51.978	40.538	3.844	245.428
M3GDP	686	61.492	45.941	6.688	252.719
GDPGrowth	767	2.840	3.673	-14.560	30.342
Lending	588	13.294	7.955	1.219	55.383
FinCrisis	768	0.25	0.433	0	1

5.3. Estimation Technique

In the setting of this study, it is very plausible that the econometric model suffers from endogeneity-biases due to measurement error, reverse causality and omitted variables (Aggarwal, Demirgüç-Kunt and Peria, 2006). A considerable amount of international remittances are sent through informal channels, implying that the remittances variable significantly underestimates true international remittances flows. Freund and Spatafora (2005) state that official remittances data understate actual flows by 35 to 75 percent.⁶ The measurement error in the independent variable may therefore cause attenuation bias in the estimated coefficients.

Reverse causality is another source of potential bias, as investments are likely to increase the level of financial inclusion as well as formally received remittances. It is argued that

⁶ Informal channels of remittances include informal networks, such as trust-based Hwala channels, cash carried in person or in-kind transfers.

remittances serve a dual mission for the diaspora: On the one hand, remittances are meant to improve the conditions of life for the relatives in the country of origin; on the other hand remittances serve as a channel for investment in the home economy (Schiopu and Siegfried, 2006). As such it is theoretically plausible that a positive economic climate in the home country – i.e. a high investment ratio – drives remittances. At the same time, investments and subsequent economic growth are likely to contribute to financial development.

Moreover, omitted variables may explain the behavior of the investment ratio, remittances and financial inclusion simultaneously. Incorrectly leaving out relevant determinants of the investment ratio leads to omitted-variable-bias in the estimated coefficients as the results compensate for missing explanatory variables.

Given the concerns towards the model, this paper draws upon a system Generalized Method of Moments approach: Dynamic panel estimators following Arellano and Bover (1995) and Blundell and Bond (1998) are increasingly used in economic literature.⁷ The estimator is designed for panels with many countries and only few periods, where the model describes a linear relationship between a dynamic dependent variable and explanatory variables. System GMM has important advantages when compared to other estimators: Firstly, it allows for endogenous regressors and lagged dependent variables in one model and it uses lagged values of endogenous variables as internal instruments. This procedure has the advantage that no external instruments have to be constructed to rule out simultaneous causality.⁸ The validity of external instruments is seen as an important limiting factor in existing research.

Secondly, the system GMM estimator operates in two stages and is based on moment conditions that relate to the model in levels as well as the model in first differences. Given the

⁷ For a more technical description of the system GMM approach, please see the chapter “Arellano-Bover/Blundell-Bond System GMM” in the Appendix.

⁸ Throughout the analysis, up to two lags of the dependent variable and two lags of endogenous right-hand side variables are used as internal instruments.

fact that the equation is also calculated in first differences, time-invariant country fixed-effects are accounted for. This addresses the concern of omitted-variable-bias in terms of constant country characteristics.

Thirdly, regarding the measurement error, it must be recognized that the precision of measurement has improved significantly in recent years as more attention was paid towards remittances (Aggarwal, Demirgüç-Kunt and Peria, 2006). To further minimize the risk of measurement error, this paper draws upon the most consistent data series available.⁹

In order to verify the validity of the approach, the following tests were conducted: To test for mean stationarity, Augmented Dickey-Fuller (ADF) unit-root tests were performed (Dickey and Fuller, 1981). All employed variables turn out to be non-stationary. To test for the validity of the autoregressive modeling, all estimations include the Arellano-Bond-Test for autocorrelation of order one and two (Arellano and Bond, 1991). An acceptable specification must not reject the null hypothesis of no autocorrelation of order two and higher. Lastly, I employ the Sargan Test to verify the legitimacy of instruments (Arellano and Bond, 1991). It assesses the overidentifying restrictions implied by the underlying moment conditions. In order to prove the power of the instruments, the test must not reject the null hypothesis. Lastly, I calculate a *pseudo R*² to measure the fit of model, calculated as the squared correlation of actual values and fitted values of the dependent variable.

6. Estimation Results

Table 2 illustrates the output from the estimations following equation (1). The results imply that remittances are a driver of investments. Column one shows that remittances have a small,

⁹ Additionally, Freund and Spatafora (2005) argue that higher financial inclusion bounds informal remittance channels. As this paper focuses on the impact of an expansion in financial inclusion on economic impact of remittances, I restrict the analysis to available data on formal remittance inflows as a percentage of GDP.

yet significant and positive effect on investments: According to the model, a 1% increase in the remittance inflows leads to 0.011% increase in the investment ratio.

Regarding the interaction of financial inclusion variables and remittances, it is evident that all terms are statistically significant and positive. In fact, this implies that financial inclusion leverages the impact of remittances on investment in a complementary way. This result contrasts some literature that suggests a substitution effect between remittances and financial development on the investment ratio (Giuliano and Ruiz-Arranz, 2009). Instead, the findings in this paper indicate that increasing the level of financial inclusion is crucial to foster the impact of remittances on investments. The elasticity of the investment ratio with respect to remittance inflows conditional on different levels of financial inclusion measured in two dimensions is illustrated in Figure 2 and discussed next.

a. Financial Depth

All interactions employing measures of financial depth indicate that the marginal effect of remittances on the investment ratio increases with higher levels of financial inclusion. Among the different variables of financial depth, the credit ratio has the strongest effect on the elasticity: Increasing the credit ratio by 10% leverages the investment-remittances-elasticity by 0.002%. Similarly, a surge in liquid liabilities as a ratio to GDP by 10% leverages the investment-elasticity by 0.001%. Deposits-to-GDP have the smallest impact on the elasticity, with a leverage of 0.0007% for a 10% increase in deposits.

The results clearly show that the amount of financial intermediation performed by the formal banking system is an important determinant to promote investments from remittances. The intercept in all estimations is positive, meaning that any type of financial system positively impacts on the elasticity. The positive slope suggests that higher development in all measures leverages investments from remittances.

b. Financial Width

Regarding the interactions with indicators of accessibility of the financial system, all terms show a positive slope. This suggests that higher access to the financial system positively impacts on the elasticity of investments with respect to remittances. Of the employed measures, the number of deposit accounts has the strongest impact: An increase of one in the average number of deposit accounts with commercial banks per adult raises the elasticity measure by as much as 0.022%. This implies that the actual uptake of financial services is an important characteristic of the banking system to promote more efficient uses of remittance inflows. Also the demographic outreach of the financial system, described as ATMs per 1000 adults, drives the elasticity up: For every 1000 additional ATMs, the investment-remittances-elasticity increases by 0.006%. The geographic outreach, i.e. ATMs per 1000km², increases the marginal impact of remittances on investments by 0.0002% for every additional unit of the indicator.

It must be noted that the intercept in these cases is negative. This suggests a minimum level of financial inclusion that is crucial to leverage remittance-induced investments. According to the estimation, the pivot point for all three measures of financial inclusion is above the sample mean. The threshold levels of financial system accessibility are roughly: 35 ATMs per 1000km², 1.4 ATMs per 1000 adults, and 1.5 deposit accounts per adult. Improving access to financial services, nonetheless, promotes a more efficient allocation of incoming capital, as the investment-ratio reacts positively to surges in remittance inflows with a progressing development of the banking sector.

Table 2. Arellano-Bover/Blundell-Bond system GMM estimates

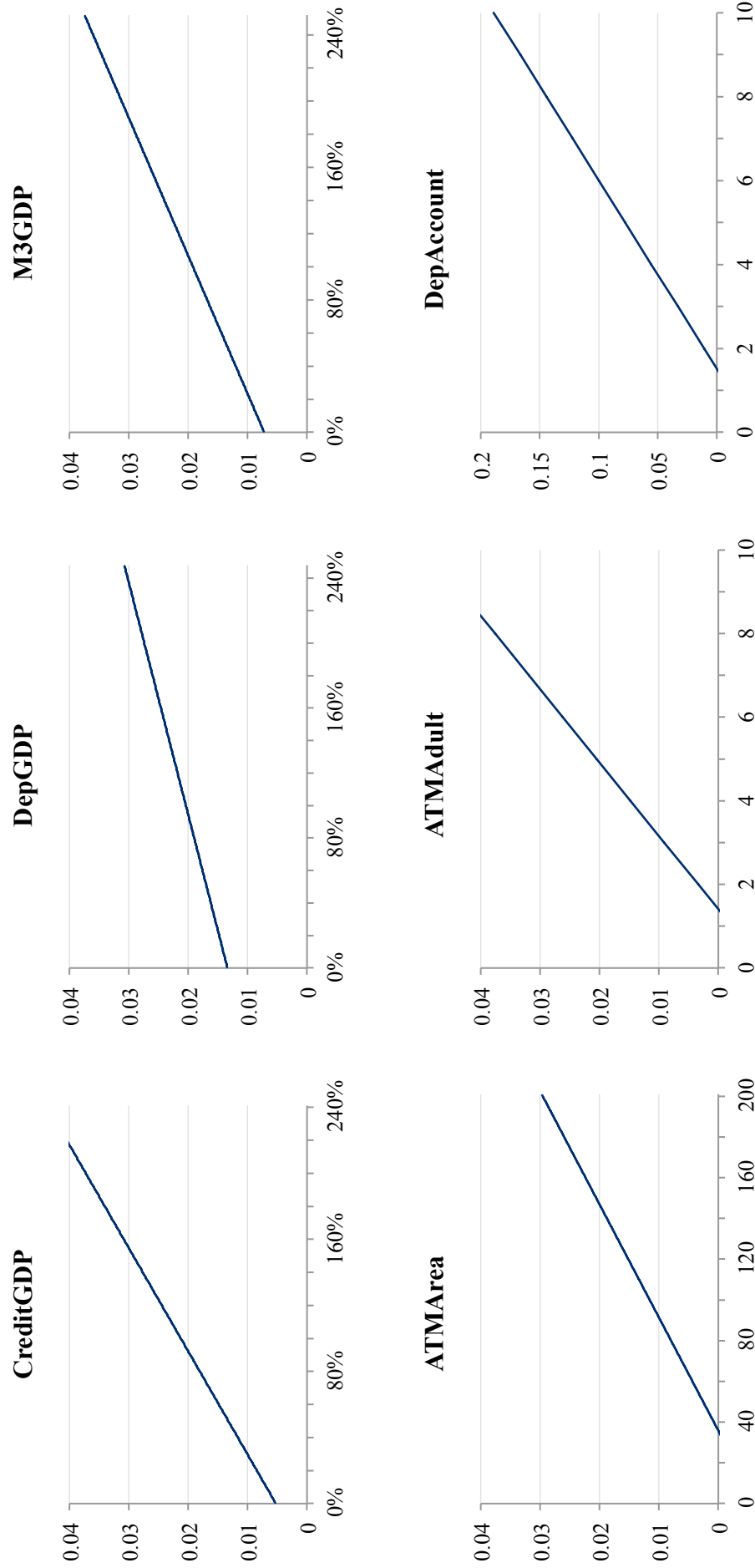
	Financial Depth			Financial Width		
	CreditGDP	DepGDP	M3GDP	ATMArea	ATMAAdult	DepAccount
L.LogInvestment	0.88191 (0.00650)***	0.86391 (0.01321)***	0.87633 (0.01372)***	0.87675 (0.00578)***	0.89113 (0.00806)***	0.91142 (0.02668)***
LogRemGDP	0.01109 (0.00216)***	0.0533 (0.00285)*	0.00727 (0.00385)*	-0.00635 (0.00263)**	-0.00799 (0.00124)***	-0.03378 (0.00461)***
FI Variable		0.00062 (0.00004)***	0.00039 (0.00006)***	0.00028 (0.00008)***	0.08765 (0.00843)***	0.02031 (0.00181)***
Interaction Term		0.00016 (0.00003)***	0.00007 (0.00003)**	0.00018 (0.00002)***	0.00570 (0.00321)*	0.02227 (0.00406)***
GDPGrowth	0.01651 (0.00038)***	0.01814 (0.00043)***	0.01786 (0.00042)***	0.02057 (0.00077)***	0.02179 (0.00038)***	0.02266 (0.00080)***
Lending	-0.00029 (0.00017)*	-0.00028 (0.00033)	-0.00091 (0.00046)*	-0.00084 (0.00039)**	0.00048 (0.00045)	-0.00286 (0.00077)***
FinCrisis	-0.01028 (0.00198)***	-0.00607 (0.00240)**	-0.01133 (0.00226)***	-0.00030 (0.00258)	-0.00098 (0.00268)	-0.02740 (0.00397)***
Constant	0.32667 (0.02202)***	0.35059 (0.04650)***	0.32610 (0.04926)***	0.34107 (0.02051)***	0.25486 (0.02811)***	0.18629 (0.08625)**
Observations	572	542	530	549	549	474
Countries	54	54	54	54	54	48 [†]
No of Instruments	64	82	82	63	63	63
AR(1) p-value	0.00	0.00	0.00	0.00	0.00	0.00
AR(2) p-value	0.14	0.16	0.16	0.20	0.19	0.14
Sargan p-value	0.73	0.99	0.99	0.82	0.87	0.86
Pseudo R ²	0.74	0.73	0.68	0.84	0.83	0.77

The dependent variable is LogInvestment. Standard errors in parentheses, * significance at 10%; significance at 5%; *** significance at 1%.

Headings of each column refer to the financial inclusion variable that is used separately as well as in the interaction term.

[†] The following countries were dropped due to unavailability of data: Tajikistan, Moldova, Albania, Nigeria, Poland and Sweden.

Figure 2. Elasticity of the Investment Ratio to Remittances Conditional on Financial Inclusion Variables



The graphs illustrate the marginal effect of remittances on the investment ratio given different levels of financial inclusion. The horizontal axis refers to the level of the respective financial inclusion variable; the vertical axis describes the elasticity of the investment ratio with respect to remittances, following equation (2).

Putting the findings together, I find strong evidence for a complementary nature of remittances and financial inclusion in promoting investments. As such, higher levels of financial development indeed leverage higher macroeconomic outcomes associated to remittance inflows. All employed indicators of financial inclusion indicate that higher sophistication as well as accessibility leads to more investments associated with remittances.

With respect to the remaining right-hand side variables, the results reveal a strong and statistically significant persistence of the investment ratio. In all estimations, lagged investment appears as a strong driving force for contemporaneous gross capital formation, as expected. A positive economic climate, i.e. GDP growth, also appears to be a significant driver of investments. High lending interest rates as well as the financial crisis during the years 2007-2009 clearly curb investments. The estimations are perfectly in line with the expected outcomes stated in section 5.

In order to evaluate the robustness of the estimation results following equation (1), I changed the panel to cover 30 economies with the highest average remittance inflows relative to GDP over the past decade.¹⁰ The estimations generally reinforce the results found for the full sample, as relevant coefficients increase in magnitude: The elasticity of investments with respect to remittances conditional on financial inclusion rises significantly. According to the estimates, the slope of the marginal impact rises noticeably while all intercepts are strictly positive. In countries with high remittances-to-GDP ratios, the elasticity of investments reacts with a higher sensitivity towards changes in both dimensions of financial inclusion.

Nevertheless, it must be noted that reducing the sample size moves the panel further away from a “large N, small T” scenario for which Arellano-Bover/Blundell-Bond system GMM estimators were designed for. In a sample with only few countries, the generation of

¹⁰ For a list of countries included in the reduced sample, see Table A.3 in the Appendix. Summary statistics for the reduced sample are presented in Table A.4 in the Appendix.

instruments can easily exceed the statistical power of the sample (Roodman, 2009). Therefore, the estimation on a reduced sample suffers from overidentification, apparent from questionably large Sargan p-values, and generally low descriptive power. The results are reported in Table A.6 in the appendix. Figure A.2 illustrates the marginal effects.

Although this paper treats the methodology as well as the underlying data very carefully in order to be internally valid and to present unbiased and robust results, some caveats remain. First of all, the data available for financial inclusion is very scarce. While detailed macroeconomic indicators for the depth of the financial system reach back as far as the 1980's, most data on access to the financial system only starts in 2004. The analysis can therefore not draw upon a large balanced dataset, raising concerns about its external validity.

Secondly, the panel is likely to suffer from a structural break as a result of the global financial crisis in 2007 and subsequent years. I do try to tackle this issue by employing a crisis dummy, however, potential bias from a structural break cannot be foreclosed.

Thirdly, this paper does not include any determinants of institutional quality in the economic model. Considering existing research on the role of institutional quality on macroeconomic performance, it is plausible that such characteristics explain some variation within the present model.¹¹ Even though including country fixed-effects reduces the problem, I cannot rule out the possibility that omitted variables bias the estimated coefficients. Similarly, I cannot rule out measurement error in explanatory variables.

Future research can benefit from the high efforts currently undertaken to gather extensive data on financial inclusion to focus on the impact of remittances on macroeconomic variables in this context. Another promising option to further improve upon existing research may be to exploit natural experiments, where changes in the level of financial inclusion can help to

¹¹ See Knack and Keefer (1995) for a detailed analysis of the role of institutional quality for macroeconomic performance.

establish a strong causality between financial development and the investment-remittance relationship. Under all circumstances, forthcoming research should include appropriate indicators to reduce the risk of omitted-variable-bias and focus on consistent remittances data.

7. Conclusion

The results in this paper clearly underline the importance of a sound financial development to leverage the macroeconomic impact of remittances. The sophistication of the financial system, i.e. the amount of transactions that are intermediated by the financial system, as well as the accessibility, i.e. the geographic and demographic distribution as well as the attractiveness of banking services, significantly impact on the effect of remittances on the investment ratio in the recipient economy: It is found that higher financial development across all indicators promotes higher investment ratios associated to remittances.

The findings suggest the following policy implications: Taking the enormous amount of internationally sent remittances into consideration, governments as well as supranational institutions should meaningfully increase access to financial institutions for remittance receiving households. This entails not only an adequate geographic and demographic distribution of contact-points, but also the availability of suitable services for such households. For example, financial products tailored to remittances, such as remittance-backed credits and insurance products are important services to offer in order to attract recipients to the formal financial sector. Furthermore, governments should, in cooperation with local financial institutions, promote a more formal international transfer of remittances. Tapping into currently informally sent remittances flows may unleash a tremendous surge of additional exploitable foreign capital.

Overall, this paper evidences what development economists have already proposed: Financial inclusion is essential to leverage the developmental impact of internationally sent remittances.

Rightly so, an expansion of the access to the formal financial sector is now on the agenda of national as well as supranational organizations as a key component of development. Especially countries with low levels of financial inclusion and high levels of remittances can significantly enhance domestic investment by supporting the development of a more accessible and more sophisticated financial sector.

8. References

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